

## **Missouri Drought**

Wayne Decker, Professor Emeritus of Atmospheric Science  
Patrick Guinan, Extension/State Climatologist

In Missouri during years when precipitation comes in a fairly normal manner, moisture is stored in the top layers of the soil during the winter and early spring, when evaporation and transpiration are low. During the summer months the loss of water by evaporation and transpiration is high, and if rainfall fails to occur at frequent intervals, drought will result. Nearly every year some areas have short periods of drought in Missouri. There have been occasional years when the soil moisture has been depleted, arid when rains have failed to replace the water lost by evaporation and transpiration for prolonged periods. These conditions have caused widespread distress. With increasing population and more competition for the use of water, wise water management is becoming more important in the Show Me state.

Drought may be conceptualized in four different ways: meteorological, agricultural, hydrological and socioeconomic. Meteorological is based on precipitation records, whereas agricultural relates to physiological impacts on plants. If drought persists for an extended period of time, hydrological impacts may occur, i.e. depleted surface, soil moisture and groundwater supplies. Socioeconomic drought incorporates aspects of meteorological, agricultural and hydrological drought as they relate to supply and demand of some economic good. For example, if demand exceeds supply for an economic good, i.e. food, hydroelectric power, the impact may be higher prices for food or energy.

Drought is commonly thought of as a growing season phenomenon, but precipitation deficiency during colder months does affect moisture abundance during the following warmer months. There is no convincing evidence that severe droughts occur in Missouri with any cyclic regularity. Drought directly affects plant and animal life by limiting water supplies, especially at times of high temperatures and high evaporation rates. Drought indirectly affects life by increasing plant and animal susceptibility to disease and fire.

Droughts are not unusual for Missouri and are expected to impact some part of the state every year. They are generally short-lived, lasting from a few weeks to a couple months. Most of the time, deficits are mitigated before the beginning of the next summer season. There are occasions, however, where droughts persist and can be multi-year events.

Mostly dry years were experienced during the 1910's, 1930's, 1950's and 1960's. Extreme hardship occurred during the Dust Bowl years of the 1930's, including a five year period from 1952 through 1956, considered to be Missouri's worst drought period of instrumental record. Another droughty period occurred during the 1980's with severe to extreme droughts affecting portions of Missouri during the summers of 1980, 1983, 1984, 1988, and 1989. Unrelenting record heat and a statewide average summer

rainfall of less than 4-inches inches give 1936 the dubious distinction of being the worst summer drought on record for Missouri.

The decade of the 1990's was benign in terms of droughts affecting Missouri. It was the wettest decade on record for the state and the only notable extensive summer droughts to affect a significant portion of the state were in 1991 and 1999. The 1999 drought carried over into the spring of 2000, but a wetter summer pattern that year ended the drought.

Another severe to extreme summer drought impacted portions of west central, northwestern and north central Missouri during 2002 and 2003 and significant growing season droughts impacted the state in 2005 and 2006. An unprecedented 2.5 year wet period impacted all of Missouri in 2008, 2009 and first half of 2010 when no area of the state experienced drought. Severe to extreme drought began impacting the Bootheel during the fall of 2010 and re-emerged over portions of southwestern Missouri the following summer.

Missouri was dealt a reality check in 2012 when a dry spell emerged at the start of spring and evolved into a historic drought by the end of summer. More than two-thirds of the country was immersed in drought as summer progressed, a situation not experienced in nearly 60 years. Missouri's first form of widespread relief occurred on the last day of August when remnants of a tropical system brought significant rainfall to much of the state. Unfortunately, by then, significant drought damage had occurred.

Thankfully, wet conditions returned early in 2013 and persisted into spring, erasing substantial water deficits that accumulated in 2012. Missouri dodged a bullet in 2013 in regard to significant hydrological impacts that would have resulted if dryness persisted, however, severe agricultural drought returned to northern Missouri during the 2013 summer.

It's important to use climate records for providing context, trends and impacts when it comes to assessing climatic vulnerability for Missouri. Extended dry and wet patterns can change abruptly and there are numerous occasions, where Missouri transitioned from one extreme to another in a short period of time.

It's been more than two generations since Missouri has experienced a severe multi-year drought, like the 1950's. The 2012 drought resulted in numerous impacts, affecting many sectors in Missouri. However, it was a young drought when compared to others, and an important question we all need to consider is how prepared are we when the next 1950's drought affects the Show Me State?